

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Standard Applicable

According to § 1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

| Frequency range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Times E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|--|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842/f | 4.89/f | (900/f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | / | / | F/300 | 6 |
| 1500-100000 | / | / | 5 | 6 |

(b) Limits for General Population / Uncontrolled Exposure

| Frequency range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Times E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|--|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | / | / | F/1500 | 30 |
| 1500-100000 | / | / | 1 | 30 |

Note: f = frequency in MHz; * = Plane-wave equivalent power density

1.2 MPE Calculation Method

$$S = (30 * P * G) / (377 * R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.3 MPE Calculation Result

Model No.: Wireless Smart Audio Module

FCC ID: 2ANOG-A76D

Device category: Mobile device

Wi-Fi (2.4G)

Maximum peak output power: 16.40 (dBm)

Maximum peak output power at antenna input terminal: 43.65(mW)

Prediction distance: >20(cm)

Prediction frequency: 2437 (MHz)

Antenna gain: 2.46 (dBi)

Directional gain: 1.76 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.0153(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

$0.0153(\text{mw}/\text{cm}^2) < 1 (\text{mw}/\text{cm}^2)$

Wi-Fi (5G)

Maximum peak output power: 11.63 (dBm)

Maximum peak output power at antenna input terminal: 14.55(mW)

Prediction distance: >20(cm)

Prediction frequency: 5240 (MHz)

Antenna gain: 4.64 (dBi)

Directional gain: 2.91 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.0084(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

$0.0084(\text{mw}/\text{cm}^2) < 1 (\text{mw}/\text{cm}^2)$

Bluetooth

Maximum peak output power: 4.965 (dBm)

Maximum peak output power at antenna input terminal: 3.14(mW)

Prediction distance: >20(cm)

Prediction frequency: 2402 (MHz)

Antenna gain: 2.46 (dBi)

Directional gain: 1.76 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.0011(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

$0.0011(\text{mw}/\text{cm}^2) < 1 (\text{mw}/\text{cm}^2)$

Bluetooth and Wi-Fi cannot transmit at the same time. So the transmitter complies with the RF exposure requirements and the SAR is not required.